

**Vendor for Catalytic Oxidizer:**  
**King, Buck Technology**  
**2356 Moore Street, Suite 102**  
**San Diego, CA 92110**  
**619/299-8431**

**Q Brief description of how thermal (catalytic?) oxidation works to destroy VOCs?**

The purpose of the project is to remove volatile organic compounds (VOCs) present in the vadose zone beneath and in the vicinity of the Subsurface Disposal Area (SDA) of the Radioactive Waste Management Complex.

The VOCs are chlorinated organic compounds that include carbon tetrachloride (CCL<sub>4</sub>), tetrachloroethylene (PCE), trichloroethylene (TCE) and trichloroethane (TCA)

The VVET process consists of extraction and treatment of VOC-laden fumes from vacuum vapor extraction (VVE) wells installed in the vadose zone at the SDA.

Extraction of the fumes from the VVE wells is accomplished using a blower attached to the inlet of the wells to draw air containing entrained VOCs from the soil.

The extracted fumes are subsequently treated to destroy the VOCs in two Thermatrix flameless thermal oxidation units located at the SDA. The Thermatrix units are designated Units A and B and are fueled by propane. An electric powered King, Buck Technologies (K,BT) flameless catalytic oxidation unit is planned to be deployed in Spring 2001 and is designated as Unit D.

The Thermatrix units are counter-current flow packed bed reactors of shell and tube configuration. The incoming gases flow upward through the tubes, reverse flow direction after exiting the tubes, and subsequently flow downward through the shell, and then finally exit the unit through the exhaust gas duct. Operating temperatures for the Thermatrix unit are 1600-1800F.

The K,BT unit is a fixed bed catalytic system. The incoming gases flow into a heat exchanger, the gases pass through an electric heater to elevate the temperature to the requirements of the oxidizer, the gases then flow downward through a fixed-bed catalyst reactor (catalyst base is a monolithic ceramic honeycomb structure similar to what is used in U.S. automobiles except that the formulation of precious metals on the catalyst perform at high efficiency and stability with chlorinated volatile organic compounds), the gases exit the catalyst reactor and re-enter the heat exchanger (designed to recover waste heat from the treated gas reducing exhaust gas temperature and increasing thermal efficiency) and exit the unit through the exhaust stack. Operating temperature for the K,BT unit is 900F.

Treatment of the VOCs is accomplished by passing the VOC-laden fumes through a ceramic matrix present inside both the shell and tubes of the Thermatrix units and through the fixed-bed catalyst of the K,BT unit.

**Q Brief description of OCVZ system, locations, depth of extraction, how much VOCs we've removed since 1996 ROD and how long we expect to operate the system?**

Brief project description:

Under the FFA/CO, Organic Contamination in the Vadose Zone, or OCVZ, was identified for a Remedial Investigation/Feasibility Study (RI/FS) as Operable Unit 7-08. Completion of the RI/FS eventually led to the *Record of Decision (ROD)*, *Declaration for Organic Contamination in the Vadose Zone Operable Unit 7-08*, finalized in November 1994 and signed in December 1994. OU 7-08 deals specifically with the OCVZ from land surface to the top of the Snake River Plain Aquifer (SRPA), approximately 580 ft. below land surface, located outside the disposal pits and trenches. The vadose zone contains volatile organic compounds (VOCs) that are primarily in the form of organic vapors, which have migrated from the buried wastes in the pits at the Subsurface

Disposal Area (SDA). The selected remedy, as identified in the ROD, was extraction and destruction of organic contaminant vapors in the vadose zone accompanied by monitoring in the vadose zone and in the underlying aquifer. The general objective of the selected remedy is to reduce the risks to human health and the environment associated with the organic contaminants present in the vadose zone and to prevent Federal and State drinking water standards from being exceeded after the 100-year institutional control period. The primary remedial action objective for the OCVZ project, as identified in the ROD, is to ensure that risks to future groundwater users are within acceptable guidelines and that future contaminant concentrations in the aquifer remain below Federal and State MCLs.

The major components of the selected remedy include:

Installation and operation of five vapor extraction wells (in addition to an existing vapor extraction well) at the RWMC as part of a first phase effort to extract organic contaminant vapors from the vadose zone. The selected remedy includes options to expand the number of vapor extraction wells for potential second and third phases.

The installation and operation of off-gas treatment systems to destroy the organic contaminants present in the vapor removed by the extraction wells. Off-gas treatment will be in the form of catalytic oxidation or an equally effective organic contaminant destruction technology.

The addition of soil vapor monitoring wells to monitor the performance of the vapor extraction wells and verify the attainment of remedial action objectives. Soil vapor monitoring will also provide information to evaluate potential modifications to the selected remedy beyond the first phase of operations. The duration of Phase I of operations was January 1996 through December 1997. Phase II of operations began in January 1998 and is anticipated to continue through September 2002. Phase III of operations is scheduled to begin October 2002 and continue through September 2006.

In January 1996, three Thermatrix oxidizers were deployed (ie, Units A, B and C). Due to operational problems, Unit C was decommissioned in May 2000. The first King, Buck Technologies catalytic oxidizer is scheduled to be deployed in March 2001. The Thermatrix units are fueled by propane (Units A and B: 2-1,000 gal propane tanks/unit) and the King, Buck oxidizer is powered by electricity (Unit D 225 KVA). If the deployment of Unit D is successful, two additional King, Buck oxidizers will be procured to replace Thermatrix Units A and B.

Since the beginning of operations in January of 1996, approximately 82,872 lbs of TVOC have been removed and treated, including approximately 53,730 lbs of carbon tetrachloride (through January 18, 2001).